

Chapter 7 Similarity

7.1 Ratio and Proportion

Ratio—a comparison of two numbers

$$a:b \quad \frac{a}{b}$$

Simplify the following ratios:

Example

1860 students

310 athletes

Athlete: student ratio

$$310:1860$$

$$\frac{310}{1860} = \frac{1}{6}$$

Athlete: non-athlete ratio $1860 - 310 = 1550$

$$310:1550$$

$$\frac{310}{1550} = \frac{1}{5}$$

Simplify

$$2 \text{ ft} : 20 \text{ in}$$

$$24:20$$

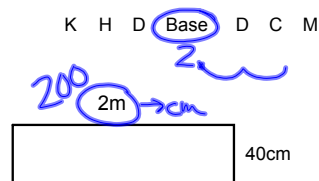
$$\frac{24}{20} = \frac{12}{10} = \frac{6}{5}$$

$$12 \text{ ft} : 5 \text{ yd} \quad (3 \text{ ft} = 1 \text{ yd})$$

$$12:15$$

$$\frac{12}{15} = \frac{4}{5}$$

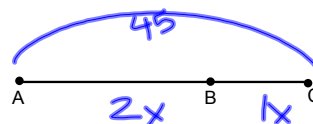
Must convert to the same unit!



Length:width

$$200:40$$

$$\frac{200}{40} = \frac{5}{1}$$

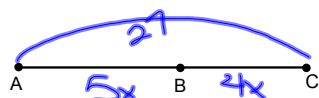


$$AC = 45$$

The ratio of AB:BC is 2:1.
Find AB and BC.

$$\begin{aligned} 2x + 1x &= 45 \\ 3x &= 45 \\ x &= 15 \end{aligned}$$

$$\begin{aligned} AB &= 30 \quad (2 \times 15) \\ BC &= 15 \end{aligned}$$



$$AC = 27$$

$$AB:BC \text{ is } 5:4$$

Find AB and BC.

$$15 \quad 12$$

$$\begin{aligned} 5x + 4x &= 27 \\ 9x &= 27 \\ x &= 3 \end{aligned}$$

The ratio of the sides of a triangle are 5:12:13. The perimeter is 90 cm. What are the lengths of the sides?



$$\begin{aligned} 5x &= 5(3) = 15 \text{ cm} \\ 12x &= 12(3) = 36 \text{ cm} \\ 13x &= 13(3) = 39 \text{ cm} \end{aligned}$$

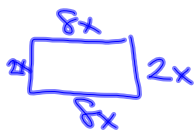
$$\begin{aligned} 5x + 12x + 13x &= 90 \\ 30x &= 90 \\ x &= 3 \end{aligned}$$

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The perimeter of a rectangle is 40ft.

The ratio of length to width is 8:2.

Find the length and the width.



$$\begin{aligned} 8x + 2x + 8x + 2x &= 40 \\ 20x &= 40 \\ x &= 2 \end{aligned}$$

4ft width
16ft length

The perimeter of a rectangle is 32m.

The ratio of length to width is 5:3.

Find the length and the width.



$$5x + 3x + 5x + 3x = 32$$

$$\begin{aligned} w &= 6m \\ l &= 10m \end{aligned} \quad \begin{aligned} 16x &= 32 \\ x &= 2 \end{aligned}$$

Proportion—equation stating 2 ratios =

$$\frac{a}{b} = \frac{c}{d}$$

$$ad = bc$$

"a is to b as c is to d"

Cross Product Property

Product of Means = Product of the extremes

Solve the following proportions:

$$\frac{5}{3} = \frac{20}{x}$$

$$\begin{aligned} 20 \cdot 3 &= 5x \\ 60 &= 5x \\ 12 &= x \end{aligned}$$

$$\frac{6}{18.2} = \frac{9}{y}$$

$$\begin{aligned} 6y &= 9 \cdot 18.2 \\ y &= 27.3 \end{aligned}$$

$$\frac{4x-5}{3} = \frac{21}{9}$$

$$\begin{aligned} 3 \cdot 21 &= 9(4x-5) \\ 63 &= 9(4x-5) \\ 63 &= 36x-45 \\ 108 &= 36x \\ 3 &= x \end{aligned}$$

On a map, every 1.5 in corresponds to 4 mi.
If two towns are 6 in apart on the map,
what is their actual distance apart?

$$\begin{aligned} \frac{1.5}{4} &= \frac{6}{x} \\ 1.5x &= 24 \\ x &= 16 \text{ mi} \end{aligned}$$

HW

p361-362

#s13-26all, 30-33all, 37-47odd